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Moore

PRICE 10 CENTS.

# VENTILATION

IN OUR

# HOMES

BY

GEO. R. MOORE,

PHILADELPHIA, PA.

There are Divine Laws in the air, which all men are bound to respect.

Published by George S. Harris & Sons,
718, 720, 722 & 724 Arch Street, Philadelphia, Pa.

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VENTILATION is the circulation of pure air through the place ventilated.

Wherever the air seems stagnant, and depressing, there is no ventilation; whatever may have been done unadvisedly to obtain it.

In partaking of the air, which is more than all our other food, we relish most that which is pure and fresh; and we ought to provide for this kind of air, not only in our dining rooms, but in all the rooms of our homes.

Wholesomeness in our meat and vegetables, without good air to complete the processes of digestion and assimilation until all the resultant fluids touch the life functions in muscle, brain and will, must ever lean toward a failure, and limit physical and mental health, if not the spiritual, below the proper standard.

Oft times, improved appetite, and spirits, revived COURAGE, mean that we have found purer and more wholesome air to breathe, as a part of our diet.

We are said to breathe 1000 gallons of air per hour; and when we consider that all this great quantity is perfectly free, its full supply to all our homes should never be deemed an extravagant luxury.

The air is an elastic, porous fluid, mainly of nitrogen and oxygen gases, but with numerous other elements of things, fluidized and floating; dust and mist, gases and odors, in varying quantities, upon and near the earth's surface.

Void of cohesion, and chemical affinities, and working by repulsion, mainly, its atoms are ever in a state of inconceivably rapid revolutions and change of place among themselves.

Probably no atom of air in the world is now where it was a moment ago, unless it is confined, or has returned; and this is true of it in its quietest moods, as well as when it moves in its massive power of winds and tempests.

All around us, and for an unknown number of miles above us, the air affords proofs of its marvelous activity of atoms, even where it seems to be doing nothing.

Holding all the visible parts of the earth in its capacious bosom, it is the physical nurse of nature; and there is no other such nurse, so watchful and hard working; and no other worker on the earth, of such universal presence, combined with unresting power, individually, by its atoms, to act and work. No other upon which living creatures are so dependent for material things, to be promptly and constantly supplied. No other which does so much really physical work, in feeding the animal and vegetable kingdoms. In its prosecution of this work, in actual weight of burdens it has no equal as a carrier. I speak not now of the fowls of the air, and of living voluntary things borne up in it. But it carries up from the earth in invisible mists to the skies, daily, almost inconceivably more weight than all the ships of commerce carry into the ports of trade; and it carries back and forth in local transportation, and transfer delivery from object to object, more weight of material things, fluidized, than would suffice to freight all the railroads of the world many times over.

The most delicate and important works for the vegetable and animal kingdoms, are performed by this invisible, physical nurse of nature.

What blooming orchard or grain field could be saved from utter barrenness, if the air should fail to carry the requisite pollen to its counterpart of vegetation?

What new-born infant could live an hour, if the air took not the requisite stimulus to its lungs?

Air works as readily in atoms, each atom for itself, as it does in its mighty volumes—each wind current for itself. But the work of air in these two particulars, by its atoms, or by its volumes, is fully as unlike as any other two distinct things under the sun; although the first prepares for the second. Boundless *invisible* work is done in preparing for limited *visible* manifestations.

Looking out upon the gathering storm as it rolls along its black clouds with pealing thunder, flashing lightning, and pouring rain, we see what we know to be consequences of the invisible motions of air atoms, some of which we may have breathed in our quiet chambers shortly before, and now of what has returned to us pure and fresh from the laboratory of the skies, washed by the shower, we may breathe again with greater relish than before; and so it is that all things that are known to us by our dull senses, and are marshalled to *visible* form and work for our own observation, either in sunshine or storm, are the products of invisible forces working in nature, till the due time of their manifestations arrives.

There is no such thing known to man, as a *visible* working power.

All visible nature nods towards the invisible, as the source of its being.

So if we would learn of nature, we must look before the first invisible, and the second, in nature, even to the Spiritual, beyond nature, for the Infinite Upholder and Creator of all. All visible things are *compounds* and *products* of invisible things; some of them abiding together in terminable unions, as we often see and find by analysis. It is because of the work of air by its atoms, that we need *ventilation*.

Figuratively speaking, still air is not idle air. We can keep no room so quiet and close, that the air will not carry up dust from the carpet and other hiding places; and with wonderful evenness of depth, spread it all over the library books, papers, and tables.

And this is about the least example of its doings, because we tried to deprive it of every opportunity and excuse for doing anything but to keep still; and this we find it cannot do, for it is under pressure of Divine Law to work.

And so it takes part in all motions by combustion, and in all chemical changes of matter whatsoever, and works as mightily by its atoms when still, as when in motion; and without any regard to itself, whether it becomes thereby despoiled of its good qualities for man's use or not, it is doing a great work, if not for the breath of men, at least for other interests of organized nature.

Looking at it in its wonderful powers of diffusion: How it takes to itself all the gases, odors, fragrance, exhalations, dust, and floating things innumerable, good and bad alike, wherever they are on the earth's surface; and how it sends all those things with effective force through itself in space, with such incredible quickness, as to defy all other than electrical alliance as a ground of explanation. We conclude that if electricity is not an element of the air, it is at least inseparable from it, and cannot be less present than the air itself, though it may extend beyond, and it may organize itself with air and cloud elements, so as to fall as a spiral swaying rope from sky to earth, and with monster power, stride in its way lifting and carrying, then dashing to earth or strewing to atoms, or blowing to pieces with its exploding fire balls of electricity, whatever in its pathway of revelling, for 150 miles run, it happened to meet; as in this tornado of Iowa, of June 17th, 1882, of which the papers told us on Monday, June 19th, that at Grinnell, 41 persons were killed, and about 150 injured. Says one: "It took up in its great spirals or funnels, houses and large droves of cattle through the air for thousands of feet, and dashed them down dead in heaps, &c." This storm is described as beginning at 7 P. M., and lasting 3½ hours, in which time it made about 150 miles travel. Many describe the storm cloud as "like a long rope, swinging backward and forward, and reaching from sky to earth."

But such comings forth of electricity are exceptional, and cannot be arranged in any regular system of ventilation. Let us return to the things that are constant, of common observation.

We smell from yonder farm house, at once, the seething ham and eggs for the farmer's breakfast; and in our own private chamber, we smell, from the kitchen, the coffee that is passing through the needful preparations for our own.

Such power of diffusion in the air, and by the air, must not be ignored in any wise plan of ventilation. Not that odors, as such, are in the least unwholesome, but they put us on observation of the wonderful power of diffusion in the air, of both the good and the evil, and warn us that the foul odors, gaseous poisons, and disease communicating germs we would exclude from our blood, and from the air we are about to breathe, must not be allowed to come together for a passing moment. If they do, diffusion will give to every particle of good air a little of the bad; whether we can detect it then or not.

It is ignorance that talks of perfect ventilation, where the fresh air only dilutes the foul. As where the foul air has no special, forceful way provided for its removal in currents distinct from those in which the pure air is introduced. Diffusion of gases is dilution of the same, and where the foul air of a room is so diluted with good air, that no odor is detected in it, it is said to be well ventilated.

I am not going to the extreme of saying, that that is no ventilation, for that would not be true. But there is a higher degree of purity of air attainable, by a very simple application of aeriform laws, to whatever place we may wish to ventilate.

If we provide the best means for the removal of bad, and the introduction of good air simultaneously, by separate ways and passages wisely located, so that no generating or radiating centre of foul air shall be allowed any place in the room at all; and then getting the required force to carry the circulation with proper activity and constancy, we shall have the best practicable ventilation. The bad air must first be put under control of force sufficient to take it to the skies.

But as this must be done in quantities, it naturally leads us to consider another kind of motion, and wonderful work of the air, which is seen in its conduct with hot and cold temperatures.

Both hot and cold atoms maintain a tenacity of their own state, as against all other atoms of air in the opposite state, that is truly wonderful. We stand facing a blazing fire, and as quantities of air are heated in their individual atoms, and hurry back from the fire, in what we call radiation, we feel a very pleasant warmth; but our backs are cold by what we call a draft of air towards the fire.

Figuratively, again: as if every warm atom of air were saying to every cold atom it meets: "Go yourself and get warm, and not draw by conduction from me."

If atoms of air conducted heat as atoms of metal do, there could be no winds, no drafts, no currents, no spontaneous circulation of air at all.

Whereas, by this non-conductability, or but slight conductability of temperature in its atoms, from one atom to another, it becomes a perfect and marvelously varied perpetual motion, because the heated atoms filling any given space, are lighter than the cold atoms required of a sufficient number to fill the same space.

The circulation of air by gravity, will always be in the direction given by the heavier displacing the lighter. It is the heavier air that takes the place of the lighter, at all opportunities, and thus produces natural ventilation in the open air. Air is warmed upon the surface of the earth, and cooled above it; and it is this Divine arrangement for sustaining perpetual motion in the atmosphere, that we are mostly concerned with, in providing mechanisms for the ventilation of dwellings, rooms, and closets. Cold air is our motive power, or the relative weight of cold air to that which is warm, is our motive power. Remembering that a pound of warm or light air will not of itself rise up, any more than a pound of lead will rise up of itself. We are to see, in providing ventilation, by what way we can best introduce cold air for the lifting up, or dispersing horizontally the warm air we wish to remove; of course warm air, under pressure, may be used as an equivalent of cold air, as a certain degree of pressure on warm air gives it the same resistance and force as cold air.

In freedom, air is warmed upon the surface of the earth and cooled above it; but when there is no wind, and the whole atmosphere is calm and still, the descending particles of cold air, and the ascending particles of warm air, perform their journey so smoothly, that it is only by the evaporations that are going on, and the rising mists and cloudy columns from chimneys, and such things, that we have proof that the vertical circulation of the air is unceasing.

Cold air will displace any warm air below it, to which it may have a free access, in any direction whatever, if a free exit is given to it.

That is the first law of the circulation of air in a state of perfect freedom.

But air in our dwellings where we wish for ventilation, is never in a state of perfect freedom; and besides primary laws of circulation, we must understand counter-balancing forces that may become factors in special cases.

As engineers or specialists in ventilation, we must know how the place to be ventilated is to be heated; and how the heating devices are managed. Wherever it is practicable, we should combine the ventilation and heating in one system; also the lighting of churches, public halls, sitting rooms, and libraries, should be combined with passages or pipes for ventilation, so as to utilize the motive power of the heat of lighting, to improve the air. This can be easily and cheaply done.

In all cases where we use pipes or flues to take the foul air out, we must extend them up to a point where there can be no back pressure from any cause, or surrounding objects outside, whatever; and then we must look well to causes inside for a return current.

Air is self-balancing in atoms, and temperatures keep its volumes in action to the same end. In ventilation we are dealing with volumes.

If the heating is so managed, that occasionally there is less pressure inside the room than outside, the outside air will come down the ventilating pipe, even against some slight force of heat to prevent it.

I have known tolerably strong ventilating currents to be reversed, by simply closing the outside air passages, to the heaters in the cellar.

I have known a whole house to be scented with cesspool odor, which ceased when a cellar window was opened, so as to increase the pressure of air in the cellar.

A hot air furnace was working in the cellar, with the windows so closed up that it most easily drew its supply of air under the kitchen floor, and from beyond, in the direction where the cesspool was; seeing the situation, it was very easy to prescribe a remedy.

Where ventilating pipes are run into smoke flues from the kitchen range, the lifting of the griddles, or leaving them partly off, will change the ventilation, by filling the smoke flue with all the air it can take, at a point where it is warmer than it is at the point where the ventilation pipe is introduced. Air but slightly heated in a confined place, will have just equal force of cold air in a state of freedom; therefore, when we use a smoke flue, we should carry the ventilating pipe in such a way as to avoid all possible counteracting pressures. One of the certain ways is to extend the pipe up as a separate passage in the flue. Cheaper methods are in some cases practicable and reliable.

All the mechanical counteracting forces to ventilation, should be carefully observed and avoided. In small rooms, the fan motion of opening and closing doors with too much force, will, for a moment, reverse the ventilation. Even in nature, ventilation often pauses at night, and returns some odor it was removing, or rather lets them fall again to the earth for want of heat to carry them up.

There are three kinds of forces to be called into requisition for ventilation: The first, for its simplicity, constancy, and economy, is heat force. The second is wind currents; only second, because winds are not constant in our climate; and the third, is mechanical force, capable of the highest degree of perfection, where expense is not considered.

The air is always busy in doing the most important work wherever it is. It never shirks. Hence we should not expose undue work for it to do for *ventilation;* whether it be for the streets of the city, or for the rooms in our dwellings, there should be intelligent preparation for it.

The contractor's well-filled and covered carts, with the sweepings of the streets, should go before it; and whatever in supplies or wastes, or moulding and decaying things in the cellars of our homes exhale burdens upon the air, should be removed by intelligent agencies and suitable means.

We need air for breathing, that comes to our lungs fresh for its first and best work; and when we have provided for its thus coming continuously, we have ventilation in our homes.

The simplest kind of ventilation is obtained by opening doors, windows, and transoms, to allow the external air to come in and mingle with that which is being contaminated, and to exchange with it as fast as opportunities are afforded. If the outside air is calm, this is ventilation by diffusion only. The next reasonable step includes appropriate means for the removal of foul air by outlets, separate and distinct from the inlets of pure air, so that a less opportunity of diffusion between the two kinds of air is permitted to take place in the room ventilated. With this step, arises the necessity of a reliable and constant force at the steady pull of removing the foul air to give place to the incoming supply of that which is pure. Now these outlets and inlets may be exactly side by side, and in the same floor, if only entirely separate.

The smallest number of questions which require to be solved by observation and good judgment, in every case of applying ventilation, is three:

*First.*—How shall we remove the foul air from the place to be ventilated, so as to make room continuously for the pure air we wish to introduce?

*Second.*—From what quarters, and in what manner, can the purest outside air be obtained?

*Third.*—How shall we secure the constant motion of the impure air, outward, in the direction we desire?

There should be no mistake in the answer of either of these questions; neither experimenting, nor guessing, in regard to either of them; for they are fundamental in every good work in ventilation.

After these, come the question of degree or amount of ventilation required; then the question of material, size of pipe and passages, with due proportion to the force used; also, art ornamentation, and final finish.

Intelligence, good taste, and judgment, will be in constant requisition, after all that can possibly be written; and after the laws of the air are well understood, and have been successfully applied in numerous examples, even as the good surgeon understanding the human anatomy, will still need good judgment, with the aid of practice and skill, to perform his work successfully.

As I look at the subject, the beneficent capabilities of ventilation are very far reaching.

The Creator seems to have qualified air by being warmed to do many good things which cold air cannot do; but not thereby disqualifying cold air for simultaneous action; but the rather affording it at just this time the greatest opportunities for its beneficent work.

In this division of labor, it falls to warm air to carry off from the earth, all impure exhalations and odors, all noxious gases, and malarial germs; while cold air is descending from the skies with its purity and health.

If I were a doctor, and had in my care a patient with any mephitic disease, I would seek to place that patient in the highest room in the house, and in the warmest possible air that could be obtained, in conjunction with a ventilation that would bring pure, soothing atmosphere to him so fast that no breath would remain long enough to be reinhaled. Fire and air excel all other disinfectants. Obviously disease germs, as well as all others, must have moisture in which to multiply and circulate, and hence that dry, hot air will destroy such germs, and thus disinfect any clothing or place in which they may be; provided the air is sufficiently hot and dry.

It is doubtful whether chemical disinfectants should be used, except under the advice of competent chemists and physicians, for it requires some knowledge of chemistry to know exactly what poisons will neutralize one another so evenly as not to generate a new one. Chemical disinfectants are of necessity poisonous.

The great work of providing suitable means for the ventilation of our homes can hardly be said to be systematically begun.

If men must live together in masses, the Divine Laws in the air demand that disease producing wastes shall be intelligently removed, either by water carriage, or in some other way, and not left for the air to struggle with them in cesspools, and other concealed places; improvements in the treatment of these things is a necessity as a preparatory step to ventilation. There is need of more intelligent co-operation among all who have anything to do with, or any interest in our homes. Not only architects and plumbers, but doctors, heads of families, and all teachers, should make the subject intelligible and familiar to all the people, to the end that it may become customary and fashionable, to have every part of the home, every room in it, perfectly sweet and pure, safe to breathe in at all times; and then let the municipal government be strong and wise enough to stop the spades that are digging cesspools in ever widening circles around this great city; and truly every home and street should as soon as possible be freed from the stench of these abominations, by a wise application of art to the removal of the wastes that cause them.

I know of no reason why the city can not have as good air as the country: only that the air itself is burdened with improper work, poisonous ferments of wastes that ought to have been removed by art.

The Register of Vital Statistics in New York City, for the past year, reports 38,609 deaths, and of these 17,750 are put down to children under five years of age; and all this in a time when no famine has prevailed, unless it was a scarcity of pure air. But again, this record of deaths places 5,260, or nearly one-seventh of the whole, to diseases belonging to some one of the mephitic classes. Can any one doubt that gaseous poisons which might have been avoided by proper cleanliness and ventilation, had much to do in giving to the city of New York its 38,609 corpses in the year 1881?

Indifference upon this subject does not seem to be the right thing.

If there had been known to be a man-stealer in that city last year, capable of stealing just one child from such family as he might himself choose to aflict, that condition of danger to all the families of New York would have been deemed just cause of universal organization for war against that wicked man-stealer.

Some twelve years ago the writer of this paper suffered a severe sickness, from sewer malaria, conducted to the room in which he slept from an adjoining bath room with a pan water closet; since that time he has felt that whatever qualifications he may have to secure such needed changes in modern conveniences, as to deprive them of all possibility of an harmful influence, might properly be applied to the subject.

The following new closets and ventilators, are among the results of these labors:

*First.*—Moore's Seaside Commode. By some this article is called a "New Patent Water Closet," as in the following Report to the Board of Health, in Atlantic City, of which the following is an exact copy—the seal of the office only being omitted:

*Office of the Board of Health of Atlantic City,*
June 13th, 1882.

To the Officers and Members of the Board of Health.

Gentlemen:—Your Sanitary Committee have made their usual tour of the city during the recess, and would respectfully report: That among other things, we visited the house of Mr. J. Canfield, on Pacific Avenue, below Ohio Avenue, for the purpose of investigating a patent water closet, in use in said house; and after the most scrutinizing examination of the same, do unhesitatingly recommend it for general use in all hotels and cottages, as being the best thing of the kind that has ever come under our notice, and fills a long felt want, and in our opinion is just the thing for Atlantic or any other city.

Signed by the Committee and attested by the Secretary, under the seal of the Board of Health of Atlantic City.

JOS. A. BARSTOW,
GEO. HAYDAY,
THOS. MAGUIRE.

By the use of this closet, all sewers and sewer connections, cesspools, and wells, are dispensed with.

No valve or tank for water supply is required. The removals are without the filling of barrels, and there is no exposure of contents at the home; and no ferments generated.

The Porcelain Bowl is a patent novelty, and the whole closet is simple, convenient, capacious, and odorless; and costs about one-half the usual expense of putting in the old style water closet; and no part of it need ever be hid away from daily inspection.

*Second.*—Moore's Patent Air Closet, with porcelain bowl and one receptacle. This in many respects is like the first, and like that, needs to be seen in order to be perfectly understood.

*Third.*—Moore's Health Water Closet. This is strictly a water closet, but forming a class by itself.

All these Closets are made in the requisite form to receive *ventilation*, and exactly adapted to combine with the following inventions, to complete a compact, economical, and efficient system of BATH ROOM VENTILATION, through any one of the above-mentioned closets.

It should be borne in mind, that all these closets have an uninterrupted ventilation while being used, (as at all other times); also, that there is no foul air confined between traps in any part of the closet; also, that they are no more dependent on ventilation than any others are; but they are more perfectly adapted, in all respects, to receive it economically and efficiently. They are not showy closets, and no one need expect to see anything of SURPRISING APPEARANCE.

The ventilators usually sold with these closets, are known as Moore's Gas Jet, and Outside Ventilators.

These may, of course, be used to ventilate other rooms and closets, if desired.

In regard to all of these closets, and ventilators, testimonials of the highest character have been voluntarily furnished the manufacturer, who will be pleased to furnish copies, and give all other needed information, at No. 526 Cherry Street, Philadelphia, Pa., or by his Agents, at Nos. 4 and 6 Friend Street, Boston, Mass.

No closets are genuine without the name of the patentee, Geo. R. Moore, cast or stamped upon them.

PATENT SEASIDE COMMODES,

AIR CLOSETS,

HEALTH CLOSETS,

PATENT WATER CLOSETS and SEATS,

All of the highest merit, and at moderate cost.

526 Cherry Street,
PHILADELPHIA, PA.

4 and 6 Friend Street
BOSTON, MASS.

And by first-class Plumbers, at their places of business,
at the same price.

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Plumbers can obtain them just as low at first-class houses
where they usually get their "supplies," as
at the manufactory.

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None are genuine without the name of the patentee
Geo. R. Moore, cast or stamped upon them.

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☞CALL AND SEE THEM.☜